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**OPERATIONAL REQUIREMENTS DOCUMENT (ORD)  
FOR**

**JOINT TACTICAL RADIO (JTR)**

1. General Description of Operational Capability. The JTR will ensure operational readiness and success by providing military commanders with the ability to command, control and communicate with their forces via voice, video, and data media forms, during all aspects of military operations. Pursuant to the goals established by the Defense Planning Guidance (1998-2003) and Joint Vision 2010, JTR will perform in the most flexible manner and be designed as a family of advanced, reliable and dynamic communications platforms. As a result, the JTR will be software-reprogrammable, multi-band/multi-mode capable, networkable, and provide simultaneous voice, data, and video communications.

a. Overall Mission Area. The JTR will support all 100, 200, and 300 series DOD mission areas identified in Office of the Under Secretary of Defense, Acquisition & Technology (OUSD[A&T]), OUSD[A&T] Assignments Directories, Abbreviations, Coding Definitions, and Titles based on the FY 1997 Program Objective Memorandum (POM), as well as federal agencies requiring the communications capability defined herein. The JTR also has the potential for use by the civilian community.

b. System Proposed. Joint, combined and coalition operations require interoperable Command, Control, Communications, Computers, and Intelligence (C<sup>4</sup>I) capabilities via line of sight (LOS) and beyond line of sight (BLOS) transmissions. The JTR will provide affordable, high-capacity tactical radios to meet these interoperability needs. The JTR satisfies a core set of requirements common to the three domains that coincide with operational missions and environments: Airborne, Maritime, and Ground Forces. Domain specific requirements are contained in the annexes to this ORD to support domain-specific needs. A family of radios will be developed for simultaneous multi-band, multi-mode, and multiple communications that use existing and advanced data waveform capabilities, to ensure the timely dissemination of battlespace C<sup>4</sup>I and global navigation information. The JTR must operate with legacy equipment and waveforms currently used by military and civilian land, air, surface ship, subsurface, man-mobile, and vehicular platforms, and incorporate new waveforms as they are developed. The family of radios will be scaleable by virtue of form, fit and cost to meet specific user operational needs. The JTR will also provide growth capability through an open system architecture that enables technology insertion through evolutionary acquisition or preplanned product improvement (P<sup>3</sup>I). The JTR will be capable of higher channel data throughput rates;

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incremental channel expansion; high levels of reliability, maintainability, and availability (RMA) enhancement, and commercial support service (CSS) compatibility. The JTR will enhance warfighter interoperability by conforming to appropriate standards and specifications of the Joint Technical Architecture.

c. Operational Concept. The JTR operational concept is to provide warfighters with digital radio communications throughout the battlespace. To achieve this operational concept, JTR will provide task-organized warfighting elements that require communications across both vertical and horizontal hierarchies with seamless, high speed, and digital information exchange within the battlespace. The JTR will allow operators in the field to expand and modify the capacity and capability of individual radios, links and networks to accommodate user demand as it becomes known. The JTR will be employed worldwide in both hostile and non-hostile environments, and in a variety of terrain and climatic conditions. The JTR will support Joint and Combined/Coalition operations by providing the capability to transmit, receive, bridge and gateway between similar and diverse waveforms over multiple communications media and networks. The JTR will operate in existing shelters, vehicles, ships, submarines, aircraft, buildings, in the field (e.g. dismounted soldier), and in planned future systems in conformance with applicable Service or agency requirements. Finally, the JTR will be capable of being operated and monitored while unattended, and remotely controlled.

d. Support Concept. The JTR will be supported by commercial sources and practices to provide the most cost effective support solution. The JTR will be supported by the DOD-wide logistics infrastructure where economically advantageous or operationally imperative. The JTR will be designed initially to accommodate the requirements identified by the Service branches as common to all domains to take advantage of economies present in commercial design practices. As the stovepiped communications systems are retired, JTR standardization will be expanded to meet virtually any mission. The intended result of this evolving commonality is the gradual DOD-wide reduction in operational, training, and maintenance manpower requirements as JTRs replace numerous dissimilar communications terminals and their respective training and maintenance infrastructures.

e. Mission Needs Statement (MNS) Summary. The JTR capabilities requirement is documented in the Mission Needs Statement (MNS) for the Joint Tactical Radio, dated 21 August 1997.

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2. Threat.

a. Threat to Be Countered. In a strategic environment threats are diverse and multi-national. Threats include regional instability caused by ethnic, religious, historical, and economic disputes; proliferation of weapons of mass destruction; and trans-national dangers such as global terrorist groups and drug traffickers. From a tactical perspective, theater commanders are challenged by regional factions seeking to expand their influence by coercion or force. These potential opponents range from nations with modern conventional military forces, organized terrorists and insurgent organizations to small bands of individuals armed with any weapon available. In the Radio Frequency operating domain, the primary threat is Information Warfare (IW) in two respects: signal transmission and information content. On the signal transmission side, there are the electronic warfare threats of signal detection, interception, and exploitation; meaconing and intrusion; direction-finding; and jamming. On the information content side, there are the threats of virus infecting, hacking, and morphing. These IW threats will likely become more sophisticated in the post-2000 time frame, as IW systems are able to attack spread spectrum and frequency hopping systems as well as non-RF information transfer systems. Increased exposure to passive detection sensors will raise the probability of detection. In addition, threats associated with conventional, unconventional, nuclear, or chemical/biological warfare environments may cause degradation or disruption of the signal or physical damage to the equipment.

b. Projected Threat Environment. The JTR will operate in the same threat environment as current systems in DOD. This threat environment extends to all locations worldwide, and affects U.S. Forces afloat, ashore, subsurface, and airborne. As a consequence, the designs of JTR production models must address the diverse threats of this threat environment.

c. System Threat Assessment Report (STAR). The general threat environment for information systems is described in the Defense Intelligence Agency (DIA) validated publications - Automated Information System Threat Environment Description, NAIC-1574-0210-0731-97 and Electronic Combat Threat Environment Description, NAIC-1574-0731-97. The threats to the JTR satellite links are described in the Military Satellite Communications System Threat Assessment. Additional threat information can be found in the Office of Naval Intelligence (ONI) Threat Assessment ONI-TA-009-98 Naval Command, Control, and Communications Computers, Navigation and IFF Threat Assessment, dated February 1998. The threats to JTR include: hostile actions against JTR emissions, electronic warfare against communication links, and hostile actions to physically destroy JTR assets.

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3. Shortcomings of Existing Systems. Existing tactical military radio communications systems were designed with mutually-exclusive architectures to perform a specific task, respectively. As such, they depart from milestones already achieved by technological advancements in the private sector, where communications systems use standardized open architectures and modular designs to deliver multiple communications and network functions from a single platform. In addition to the benefits of greater utility, open architectures and modular designs promise lower acquisition, training, operation and maintenance costs by reducing the number and diversity of communications equipment needed to support singular, mutually-exclusive tasks. In general, most current tactical systems:

a. operate on a single frequency band and are limited to a single waveform and generally can interoperate only with like specified radios (mandating multiple radios for most weapon platforms and command and control nodes).

b. operate at low to medium data rates in transmission, and have limited routing and networking capabilities.

c. cannot automatically adjust performance (bandwidth and power) to meet demand. Fixed data rate channels waste capacity when not needed, and cannot provide higher capacity when the demand exists.

d. have numerous system-unique components and parts, requiring individual support and creating a logistics burden.

e. are not capable of simultaneous voice, video, and data operations.

f. do not employ an open systems architecture.

g. require extensive depot level equipment and/or component changes to implement new capabilities in installed platforms.

h. do not allow incremental or modular upgrades to increase the choices of waveforms and the bandwidth within those waveforms, or modify message system standards.

i. are based on non-modular designs and are not conducive to cost effective improvements and modifications dictated by interoperability requirements as they become known.

j. have high recurring integration costs to add new capabilities/functionality to platforms.

k. are not capable of simultaneous operation with other systems in the same or other domains.

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l. do not have adequate frequency flexibility to operate globally, which precludes them from operating completely in compliance with applicable National and International rules and regulations governing the use of the electromagnetic spectrum.

m. lack the ability to conduct complex network management and to facilitate inter-service interoperability.

4. Capabilities Required. System performance requirements are categorized as Threshold or Objective, and some threshold requirements are further defined as a Key Performance Parameter (KPP). The threshold value is the minimum acceptable value that, in the user's judgment, is necessary to satisfy the need. If threshold values are not achieved, program performance is seriously degraded, the program may be too costly, or the program may no longer be timely. The objective value is that desired by the user and which the program manager is attempting to obtain. The objective value could represent an operationally meaningful, time critical, and cost-effective increment above the threshold for each program parameter. In those instances when an objective value has not been cited the objective value equals the threshold value. Objectives may be refined as the program advances in the procurement cycle. A Key Performance Parameter (KPP) is that capability or characteristic so significant, that failure to meet the threshold can be cause for the concept or system selection to be reevaluated or the program to be reassessed or terminated. Those system performance requirements, cited below, pertain to all applications of the JTR.

a. System Performance. The JTR shall meet the following performance parameters:

(1) General Performance Requirements:

(a) The JTR architecture shall be capable of supporting secure and non-secure voice, video and data communications using multiple narrow-band and wideband waveforms as specified in paragraph 7, tables 1 and 2, identifying threshold KPP, threshold, and objective requirements for for FY`00 through FY`05, including future waveforms as they are developed.

(b) The JTR program shall provide an internal growth capability through an open systems architecture approach in compliance with the Joint Technical Architecture, and shall be modular, scaleable, and flexible in form factor (threshold) (KPP).

(c) The JTR shall provide the operator with the ability to load and/or reconfigure modes/capabilities (via

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software) while in the operational environment (threshold)(KPP).

(d) The JTR shall have the ability to be reconfigured (hardware changes/upgrades) in the operational environment (threshold).

(e) The JTR shall be capable of operating in a radio frequency spectrum from 2 MHz to 2 GHz suitable for the particular set of waveforms that the JTR will support (threshold)(KPP). The JTR shall be capable of incorporating military and commercial satellite and terrestrial communications above 2 GHz (objective).

(f) The JTR shall have the ability to retransmit/cross-band information between frequency bands/waveforms supported (threshold)(KPP) Maritime/Fixed Station Domain (Objective).

(g) The JTR shall be capable of operating on multiple full and/or half-duplex channels at the same time (threshold)(KPP).

(h) The JTR shall have the capability of automatic protocol conversion and message format translation of voice, video, or data between frequency bands or waveforms as specified in paragraph 7, Table 1 (threshold).

(i) Without interfering or overriding terminal operations, the JTR shall be capable of distributing and accepting software upgrades that have integrity and can be authenticated when transmitted through the network with which it interfaces (threshold).

(j) To operate globally the JTR shall

1 comply with applicable National, and International spectrum management policies and regulations(threshold).

2 be mutually compatible with other electric or electronic equipment within their expected operational environment (threshold).

(k) The JTR shall provide the ability to scan a minimum of 10 operator designated fixed frequencies or presets (threshold), and individual frequency bands (objective).

(l) The JTR or its installation kit shall provide domain specific interfaces to ancillary equipment in order to minimize platform integration impact, i.e., power amplifiers, power supplies, antenna couplers, antennas, etc. as stated in the

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annexes (threshold).

(m) The JTR shall employ protective measures against electromagnetic pulse (EMP) and directed energy threats (objective).

(n) After an unexpected power loss, and upon restoration of power, the JTR shall be capable of completing a components diagnostics test and a systems recovery to include: hardware, software, presets and settings (threshold).

(o) The JTR shall provide a standard interface to exchange voice/video/data with Service host systems (threshold).

(2) Security Performance Parameters:

(a) The JTR shall provide a scaleable, embedded programmable cryptographic capability, which will support black key (threshold) Maritime/Fixed Station Domain (Objective).

(b) The JTR shall provide transmission security (TRANSEC) capability (threshold).

(c) The JTR shall be capable of interfacing with an National Security Agency (NSA) approved electronic key management system (EKMS) (threshold).

(d) The JTR shall be capable of using over the air rekeying (OTAR)/zeroizing (OTAZ)/ transfer (OTAT) as implemented by the Key Management Authority (threshold).

(e) The JTR shall be capable of remote identification and exclusion (lockout) (threshold).

(f) The JTR shall be capable of supporting encrypted Global Positioning System (GPS) (threshold).

(g) After a primary power loss, the JTR shall be capable of retaining perishable cryptographic variables for at least 72 hours (threshold) and 144 hours (objective).

(h) The JTR shall be capable of implementing public cryptography to provide privacy (objective).

(i) The JTR shall provide for INFOSEC and protection of data in a Secret High network (threshold), and at multiple levels of Security from Unclassified through Secret (objective).

(j) In conjunction with waveforms for JTR domain family members in Paragraph 7, Tables 1 and 2, the JTR shall be capable of supporting cryptographic functions which operate with

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or have an external interface to cryptographic systems as listed in Annex D (threshold).

(k) The JTR shall be capable of being handled as an unclassified Controlled Cryptographic Item (CCI) when the embedded device that provides security is not keyed (threshold).

(l) The JTR shall have the capability to zero locally by requiring at least two discrete operator actions to reduce the probability of accidental zeroing (threshold).

(m) The JTR shall employ the Defense Information Infrastructure (DII) Key Management Infrastructure in supporting JTR integrity, identification, and authentication requirements (threshold).

(n) Each JTR shall be equipped with the capability to receive Global Positioning Satellite (GPS) signals. This GPS receive capability shall be in addition to the number of channels for each JTR category specified by the Domain Annexes.

(3) Networking Performance Parameters: The JTR shall be capable of providing scaleable networking services for connected RF (over the air) networks, host networks, and hybrid networks in Increment 3 and in accordance with the phased procurement implementation specified in paragraph 7 (threshold) (KPP).

(a) The networked JTR shall extend, between and across the geographical and/or organizational boundaries within a nominal area of operations (threshold) (KPP).

(b) The networked JTR shall provide a scaleable and interoperable means to establish point-to-point (two way), multi-point (two way), multicast (up to 100 selected nodes), and broadcast data capability between/among any user-selected nodes in a joint network (threshold).

(c) The networked JTR shall provide for mobile JTRs to readily transfer between authorized networks. This transfer should be transparent to the user. (threshold).

(d) The networked JTR shall provide routing capability, interface connectivity that extends into the Internet Protocol, military packet networks(threshold), and/or cell networks (objective).

(e) The networked JTR shall perform dynamic intra-network and inter-network routing for data transport based on priority (threshold).

(f) The networked JTR shall include hardware and



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software sufficient to organize, manage, and dynamically control network connectivity structures, routing mechanisms, and bandwidth allocations (threshold).

(g) The networked JTR shall selectively transmit individual location information to selected JTR nodes and be passed in the Military Grid Reference System and/or in the latitude and longitude to a host system (threshold).

(h) The JTR system shall provide network management capability to respond to changes in mission or organization, and reconfigure at a minimum a battalion-sized joint task force network (with approximately 150 JTRS terminals), in 15 minutes (threshold) (KPP) 5 minutes (objective).

(i) The JTR network shall have the capacity to meet the information flow of waveforms/capabilities as specified in paragraph 7, Table 1 (threshold), and meet the information flow required by new capabilities and a latency near zero (objective).

(j) The JTR shall provide information to Service and joint network management tools to assess and report network link status (threshold).

(k) The JTR network shall provide a name-to-address translation service that supports automatic registration and de-registration of host names and addresses (threshold).

(l) The JTR network shall provide the capability for users to address data to other users by using position/organization names in the address fields (e.g., S3.2AR.BDE) (threshold).

(m) The JTR system shall provide the means to support message delivery based on geographic areas (objective).

(n) The JTR network shall provide information and be interoperable with the joint network management tool, to allow network managers to remotely identify and configure user access and profile parameters to prioritize users' network access and message delivery (threshold).

b. Logistics and Readiness. The JTR shall have the following mission-capable requirements for both wartime and peacetime.

(1) The JTR shall have an operational availability ( $A_0$ ) of 96 percent (threshold)(KPP) and 99 percent (objective).

(2) The JTR hardware size and weight shall be compatible with current platforms, as specified in the domain annexes, and

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shall consolidate many individual functions of current terminals into one physical chassis, thereby reducing weight and space requirements (threshold).

(3) The JTR shall be logistically supportable within each Service (threshold).

(4) The JTR internal test and diagnostic built-in-test (BIT) provisions shall be capable of fault isolation (threshold).

c. Other System Characteristics.

(1) The JTR shall provide an operator-selectable capability to operate in listening silence (receive only) mode (threshold).

(2) The JTR shall effectively operate in wartime operations and in worldwide conditions as specified in the domain annexes (threshold).

(3) The JTR shall be capable of being operated and maintained in a nuclear, biological and chemical (NBC) environment, as specified in the domain annexes (threshold).

(4) The JTR shall be capable of providing a platform-specific human computer interface, as specified in the domain annexes (threshold).

(5) The JTR shall be capable of incorporating power management to achieve maximum efficiency (threshold).

(6) The JTR shall be capable of withstanding power surges (threshold).

5. Program Support. Program support for the JTR shall be in place when the initial operational capability (IOC) is achieved, and shall be expanded, as necessary, for each Service prior to achieving full operational capability (FOC).

a. Maintenance Planning. Operator level maintenance shall be limited to reconfiguration for needed capabilities, and preventive/corrective maintenance shall be limited to the predetermined lowest repairable unit (LRU). Life-cycle logistics support factors shall be implemented that provide for cost effective maintenance of the JTR.

b. Support Equipment. Where the DoD logistics structure is used, General Purpose Electronic Test Equipment (GPETE) shall be selected from existing standard GPETE equipment lists. The use of Special Purpose Electronic Test Equipment (SPETE), special purpose support equipment, and special tools shall be avoided to

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the maximum extent possible. JTR BIT/built-in-test equipment (BITE) performance shall not be accomplished using GPETE, SPETE, or substituting modules. For all non-developmental item (NDI) equipment the contractor shall identify automatic test equipment (ATE). For contractor provided logistics support, equipment and processes shall be identified.

c. Human Systems Integration.

(1) Human Engineering Constraints. JTR must be easily maintainable and operable, incorporating the principles of modularity and commonality. JTR displays and controls must be viewable in direct sunlight, at night and through night-vision goggles. The JTR shall conform to applicable human engineering design criteria.

(2) Training and Documentation.

(a) Required initial operational and maintenance (O&M) training on the JTR will be provided by the manufacturer. New equipment training will be conducted during initial fielding. Follow-on training will be provided through Service specific formal training channels. Maximum advantage will be taken of available embedded training.

(b) Training materials provided will be available in multimedia, including operator and maintainer tutorials, and computer based training (CBT).

(c) Operator and maintenance technical documentation will be provided with the JTR at the time of delivery, and upon delivery of any upgrades which affect operations and maintenance.

(3) Manpower and Force Structure Assessment. Operation of the JTR should not require additional manning. Additional manning may be required in the areas of maintenance and network management of the JTR. In addition, the JTR should not require new skill qualifiers.

(4) Environmental, Safety, and Health (ESH). The JTR must comply with the environmental, safety and health requirements of DOD 5000.2R and all other federal ESH laws and regulations.

d. Computer Resources.

(1) The JTR management and components shall provide checks for computer operations system viruses during systems initialization and routine operations. The operator shall be alerted to a detected virus.

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(2) A software support capability shall be functional by JTR's Initial Operational Capability (IOC) and must provide for update, configuration control, and management of all computer programs and data.

e. Other Logistics Considerations. For Army and Air Force employment, logistics support should include sufficient quantities of Mobility Readiness Spares packages and Peacetime Operating Stocks for continued supportability. For the Navy and Marine Corps, spares will be based on the On Board Repair Parts requirements, as calculated for each platform. If required, spares will be pre-positioned. In compliance with the Continuous Acquisition Lifecycle Support (CALs) program, JTR shall comply with specifications and standards approved within DOD for creation, use, and management of technical and other data in digital form.

f. Command, Control, Communications, Computers, and Intelligence.

(1) The frequency range of the JTR must be flexible enough to adapt to changes in DOD and non-DOD Government frequency spectrum allocations, as well as being capable of being used in civilian bands, both in the continental United States (CONUS) and overseas. The key steps to assure radio frequency spectrum support are spectrum certification, frequency assignments, and host nation coordination.

(2) The JTR shall have adequate security safeguards and compartmentalization to ensure the confidentiality, integrity, and availability of the information passing through or residing on it. Security features of the JTR will comply with the Multi-Level Information Systems Security Initiative (MISSI) or its follow-on. All C<sup>4</sup>I resources will be certified for end-to-end interoperability by complying with the intent of CJCSI 6212.01A, 30 June 1995.

(3) This ORD has been assigned a joint potential designator (JPD) of "Joint."

g. Transportation and Basing. JTR distribution and basing will be consistent with existing force structures and deployment concepts. If JTR components are integrated into other systems, transportability requirements of the host system apply.

h. Standardization, Interoperability, and Commonality.

(1) The JTR acquisition will adhere to the Joint Technical Architecture in identifying the standards and guidelines.

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(2) Only National Security Agency (NSA) endorsed and approved security products, techniques, and protective services shall be used to secure classified communications. Electronic keying shall be applied to allow cryptographic processes implemented by JTR. All cryptographic systems must be interoperable with the EKMS, and the envisioned Joint Key Management System (JKMS).

(3) The JTR must be interoperable with National Airspace System architecture.

(4) For operation with North Atlantic Treaty Organization (NATO) member nations, the technical characteristics of the JTR shall conform with the applicable requirements of the Standardization Agreements.

(5) All information technology for the JTR shall be DOD approved and where applicable, selected from those contained in the DISA approved "Profile of Standards."

i. Geospatial Information and Services . When required, JTR will use National Imagery and Mapping Agency (NIMA) joint service mapping standards to ensure interoperability with other systems. Geographic mapping and gridding functions will be based on Universal Transverse Mercator (UTM) and latitude/longitude coordinates referred to by the World Geodetic System (WGS-84), be compatible with existing GPS receivers, and upgradable to future GPS receivers. The JTR GPS receive capability is in addition to the number of required channels specified by the domain annexes.

j. Environmental Support. None.

6. Force Structure. Refer to the domain annexes for the Services force structure requirements. Other governmental agencies' force structure requirements will be described on a case by case basis.

7. Schedule Considerations.

a. The system will be developed incrementally providing increased capabilities as it matures.

b. The JTR will support the modes/capabilities depicted in Tables 1 and 2.

c. Delivery of initial and follow on production level articles shall be in compliance with the threshold and objective capabilities, and are required to begin in FY00 (Table 1). Specific quantities and capabilities within each domain will be identified to determine actual IOC.

d. Delivery of follow-on production level articles,

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entailing additional objective values, are scheduled to begin in FY02 (Table 2).

e. IOC: TBD

f. FOC: TBD

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<b>Table 1. Modes/Capabilities/Data Processing With a Threshold (T-XY), Threshold KPP (K-XY) and Objective (O-XY) Requirements in FY-XY</b>								
<b>Modes/ Capabilities</b>	<b>Frequency Band</b>	<b>Current Bandwidth</b>	<b>Data Rates</b>	<b>Family*</b>				
				<b>H</b>	<b>D</b>	<b>V</b>	<b>M/F</b>	<b>A</b>
HF Independent Side Band (ISB)w/ Automatic Link Establishment (ALE)	2-30 MHz	3 -12 KHz	4.8/9.6 Kbps			O-00 T-01	O-00 T-01	O-00 T-01
HF Single Side Band (SSB) w/Automatic Link Establishment (ALE)	2-30 MHz	3 KHz	2.4/9.6 Kbps		O-02 T-03	O-00 T-01	O-00 T-01	O-00 T-01
Link 11 (TADIL-A)	2-30 MHz and 225-400 MHz	3 KHz and 25 KHz	2.25 Kbps				O-01 T-02	O-01 T-02
STANAG 4285 (HF)	2-30 MHz	3 KHz	2.4 Kbps				O-01 T-02	
STANAG 4529	2-30 MHz	1.24 KHz	1.8 Kbps				O-01 T-02	
ATC HF Data Link	2-30 MHz	3 KHz	300,600,1200,1800 bps		O-02 T-03	O-02 T-03	O-02 T-03	O-02 T-03
SINCGARS	30-88 MHz	25 KHz	16 Kbps	K-03	K-02	T-00	T-00	T-00
SINCGARS SIP/ASIP	30-88 MHz	25 KHz	16 Kbps	K-03	K-02	O-00 T-01	O-00 T-01	O-00 T-01
VHF Mobile Subscriber Radio Terminal (MSRT)	30-88 MHz	25 KHz	16 Kbps		O-02 T-03	K-02		
VHF FM	30- 88 MHz	25 KHz	16 Kbps	O-03	O-02 T-03	O-00	O-00	O-00
VHF for ATC (replaces existing 25 kHz spacing)	118-137 MHz	8.33 KHz			O-03	O-00 T-01	O-00 T-01	T-00
VHF AM	120-156 MHz	25 KHz	16 Kbps		O-02 T-03	O-00 T-01	O-00 T-01	O-00 T-01
VHF FM Public Service (Land Mobile Radio)	136-174 MHz	12.5 KHz and 25 KHz	25 KHz: 16 Kbps	O-03	O-02 T-03	O-00 T-01		
ATC VHF Data Link	118-137 MHz	25 KHz	31.5 Kbps		O-02 T-03	O-02 T-03	O-02 T-03	O-02 T-03
UHF AM/FM PSK LOS	225-400 MHz	25 KHz	16 Kbps		O-02 T-03	O-00 T-01	O-00 T-01	O-00 T-01
HAVE QUICKI/II	225-400 MHz	25 KHz	16 Kbps		T-02	T-00	T-00	T-00
UHF DAMA/DASA SATCOM (MIL-	225-400 MHz	5 and 25 KHz	75, 300, 600 bps, 1.2,		O-02	T-00	K-00	K-00

\* **Legend:** H-Handheld; D-Dismounted; V-Vehicular; M/F-Maritime/Fixed; A-Airborne

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<b>Table 1. Modes/Capabilities/Data Processing With a Threshold (T-XY), Threshold KPP (K-XY) and Objective (O-XY) Requirements in FY-XY</b>								
<b>Modes/ Capabilities</b>	<b>Frequency Band</b>	<b>Current Bandwidth</b>	<b>Data Rates</b>	<b>Family*</b>				
				<b>H</b>	<b>D</b>	<b>V</b>	<b>M/F</b>	<b>A</b>
STD-188-181/182/183 (Compliant)			2.4, 4.8, 9.6, 16 Kbps		T-03			
UHF SATCOM Medium Data Rate (MDR)	225-400 MHz	5 and 25 KHz	5 kHz: 7.2 Kbps 25 kHz: 32 Kbps				O-00 T-01	
STANAG 4231 (UHF SATCOM)	224-400 MHz						O-00 T-01	
Link 4A (TADIL-C)	225-400 MHz	25 KHz	5 Kbps				O-00 T-02	O-00 T-02
Link 11B (TADIL-B)	225-400 MHz	25 KHz	0.6, 1.2, 2.4 Kbps			O-00 T-02	O-00 T-02	
Joint Tactical Terminal (JTT)/Common Integrated Broadcast Service Module (CIBS-M)	225-400 MHz	5 and 25 KHz	19.2 Kbps		O-02 T-03	O-02 T-03		O-02 T-03
SATURN	225-400 MHz	25 KHz						O-01 T-04
High Capacity Line of Sight (HCLOS)	225-440 MHz and 1350-2690 MHz	50 MHz	256,512,768 Kbps, 1.5,2.5,4,8 Mbps				O-01 T-04	
UHF LOS High Data Rate (HDR)							O-00 T-02	
UHF FM Public Service (Land Mobile Radio)	403-512 MHz	5, 12.5, and 25 KHz	25 kHz: 16Kbps	O-03	O-02 T-03	O-00 T-02		
Enhanced Position Location Reporting System (EPLRS)	420-450 MHz	3 MHz	57 Kbps VHSIC SIP 114 Kbps VECF	O-03 T-05	K-04	K-02		K-02
Cellular Radio	800-900 MHz	12.5 - 30 KHz	2.4 - 9.6 Kbps	T-03	O-02 T-03	O-02 T-04	O-02 T-04	O-02 T-04
GPS - Commercial Availability	L1 Carrier: 1575.42 MHz	C/A Code: 2.046 MHz		T-03	T-02	T-00	T-00	T-00
GPS - US Government Encrypted	L1 Carrier: 1575.42 MHz L2 Carrier: 1227.6 MHz	P-Code: 20.46 MHz Nav/System Data: 50 Hz P- Code: 20.46 MHz		T-03	T-02	O-00 T-02	O-00 T-02	O-00 T-02
Link 16 (TADIL-J)	969-1206 MHz	3 MHz	236/118 Kbps FEC		O-04 T-03	O-02 T-03	O-02 T-03	O-02 T-03



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<b>Table 1. Modes/Capabilities/Data Processing With a Threshold (T-XY), Threshold KPP (K-XY) and Objective (O-XY) Requirements in FY-XY</b>								
<b>Modes/ Capabilities</b>	<b>Frequency Band</b>	<b>Current Bandwidth</b>	<b>Data Rates</b>	<b>Family*</b>				
				<b>H</b>	<b>D</b>	<b>V</b>	<b>M/F</b>	<b>A</b>
Mode S Level 4	1030/1090 MHz	3.5 MHz/3 MHz						O-03 T-05
INMARSAT A, B, C, M	1525.0-1660.5 MHz	INMARSAT Service- specific			O-02 T-04	O-02 T-04	O-02 T-04	O-02 T-04
Digital Wideband Transmission System (DWTS)	1350-1850 MHz	125 kHz	144,256,288,512,1024, 1544,2048 Kbps			O-02 T-04	O-02 T-04	
Soldier Radio	1.75 - 1.85 GHz	25Kz	16Kbps	T-04	O-02 T-03	O-02 T-04		
Wideband Digital Waveform (new, <del>or</del> modified or existing waveform)	Vendor Proposed*	Vendor Proposed*	Vendor Proposed*	O-04	K-02	K-02		K-02
VMF translation to Link16 and (vice versa)		31 kHz	15.2,28.8,57.6 Kbps		O-04	O-04 T-05	O-02 T-03	O-02 T-04
COBRA	TBP***	TBP***	TBP***	T-03				

\* **Legend:** H-Handheld; D-Dismounted; V-Vehicular; M/F-Maritime/Fixed; A-Airborne\*\* Vendor Proposed - Not government provided, developed or defined; to be based on cost, technologies and evolving needs. However, frequency bands proposed must be available for U.S. military forces worldwide, and must be spectrum efficient.

\*\* \* To Be Provided.

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<i>Table 2. Modes/Capabilities/Data Processing with Only Objective (O-XY) Requirements in FY-XY</i>								
Modes/ Capabilities	Frequency Band	Current Bandwidth	Data Rates	Family*				
				H	D	V	M/F	A
Link 22	3-30 MHz and 225-400 MHz						O-03	O-03
Mobile Satellite Service (MSS)	1.61 - 2.5 GHz		2.4 - 9.6 Kbps	O-05	O-02	O-05	O-03	O-03
Mixed Excited Linear Prediction (MELP)				O-05	O-02	O-04	O-04	O-04
Personal Communications System (PCS)				O-03	O-02	O-02	O-02	O-02

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\* **Legend:** **H**-Handheld; **D**-Dismounted; **V**-Vehicular; **M/F**-Maritime/Fixed; **A**-Airborne

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**ANNEX A**

**AIRBORNE DOMAIN**

1. General Description of Operational Capability. No change.

a. Overall Mission Area (Supplemental). The JTR will be employed in civilian and military (fixed wing, rotary, and unmanned) airborne platforms to support the mission areas defined in this ORD.

b. System Proposed (Supplemental). The airborne JTR will provide an integrated, modular communications and navigation capability. Individual platform requirements will define the capabilities provided by JTR, and their respective levels and complexities.

c. Operational Concept (Supplemental). The JTR will support the communications and navigation capabilities of platforms throughout their operational deployments. The JTR equipment will be operated and maintained in accordance with the standard operating procedures for the host platforms that it supports.

d. Support Concept. No change.

e. Mission Needs Statement (NMS) Summary. No change.

2. Threat. No change.

a. Threat to be Countered. No change.

b. Projected Threat Environment. No change.

c. System Threat Assessment Report. No change.

3. Shortcomings of Existing Systems. No change.

4. Capabilities Required. No change.

a. System Performance (Supplemental). The JTR shall meet the following supplemental airborne specific performance parameters:

(1) General Performance Requirements:

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(a) The airborne JTR shall meet required performance parameters when integrated into land and sea based fixed, rotary wing, and unmanned aircraft (threshold).

(b) The airborne JTR will provide the following interfaces to existing aircraft peripheral equipment for operation in all host platforms.

1 Integrated visual displays: The JTR will provide interfaces for host platform visual displays (threshold).

2 Data input/output devices: The JTR will provide standard interfaces for host platform data input/output devices, including control and traffic platform busses (threshold).

3 Audio input/output devices: The JTR will provide one audio input/output interface per channel(threshold).

4 Remote control devices: The airborne JTR will provide for remote control and operation via a remote control unit or through the host platform bus interface (threshold).

(c) The airborne JTR shall support performance parameters while operating in the operational profile of each host airborne platform (threshold).

(d) The airborne JTR will support preset operation of channels by providing a minimum of 25 presets per channel (threshold) and a minimum of 35 presets per channel (objective).

(e) In addition to GPS, the airborne JTR will provide up to six channels (threshold), with growth capability up to eight channels (objective).

(f) The airborne JTR shall provide the capability to choose from among at least 10 waveforms without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms.

(2) Security Performance Parameters: No change.

(3) Networking Performance Parameters: No change.

b. Logistics and Readiness. No change.

c. Other System Characteristics (Supplemental).

(1) Physical Integration into User Platforms.

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(a) Integration of JTR into user platforms shall be accomplished with minimal demands for platform modifications. The JTR system shall provide radios and ancillaries that have the following characteristics:

1 Size: The airborne JTR (without ancillaries) will be no larger than a  $\frac{3}{4}$  long air transportable rack (ATR) (threshold) and a  $\frac{1}{2}$  ATR (objective).

2 Weight: The airborne JTR shall be no heavier than the radios it replaces (threshold) and at least 75% lighter (objective).

3 Prime power: The airborne JTR will operate off existing aircraft power systems for each platform (threshold).

4 Prime power: The airborne JTR will draw no more power than the radios it replaces (threshold) and draw at least 75% less power (objective).

5 Frequency management: The airborne JTR shall provide interfaces to on-board automated frequency management systems (threshold).

(b) The JTR must be capable of operating in the following environmental conditions:

1 Altitude: up to 65,000 feet unpressurized (threshold), and to 75,000 feet unpressurized (objective).

2 Operating and Non-operating Temperature: -40°C to +71°C (threshold), and operate in temperatures down to -70°C (objective).

3 Humidity: 95% condensing (threshold).

4 Acceleration: Operate through 9 Gs (threshold).

(2) Personnel Health and Safety

(a) The JTR shall be capable of being operated and maintained in a nuclear, biological, and chemical (NBC) environment by persons in full Mission Oriented Protective Posture IV (MOPP IV) protection gear (threshold).

(b) The JTR man-machine interface shall be compatible with Night Vision Imaging System (NVIS) standards and

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shall be capable of being operated by persons wearing night vision goggles (NVG) (threshold).

5. Program Support. No change.

a. Maintenance Planning. No change.

b. Support Equipment. No change.

c. Human Systems Integration. No change.

d. Computer Resources. No change.

e. Other Logistics Considerations. No change.

f. Command, Control, Communications, Computers, and Intelligence. No change.

g. Transportation and Basing. No change.

h. Standardization, Interoperability, and Commonality. No change.

i. Geospatial Information and Services (GI&S) No change.

j. Environmental Support. No change.

6. Force Structure. TBD

7. Schedule Considerations. No change.

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**ANNEX B**

**MARITIME and FIXED STATION DOMAIN (SURFACE SHIP/SUBMARINE)**

1. General Description of Operational Capability. No change.

a. Overall Mission Area (Supplemental). The JTR will operate on surface and sub surface platforms that support the mission areas defined in this ORD.

b. System Proposed (Supplemental). The maritime JTR shall be part of a communications system that provides modular communicating and networking capabilities.

c. Operational Concept (Supplemental). The maritime JTR shall be Automated Digital Network System (ADNS), Advanced RF distribution systems, and Submarine Antenna Distribution System (SADS) interoperable (i.e. JMCOS interoperable).

d. Support Concept. No change.

f. e. Mission Needs Statement Summary. No change.

2. Threat.

a. Threat to be Countered. No change.

b. Projected Threat Environment No change.

c. System Threat Assessment Report. No change.

3. Shortcomings of Existing Systems. No change.

4. Capabilities Required. No change.

a. System Performance (Supplemental). The JTR shall meet the following supplemental maritime specific performance parameters:

(1) General Performance Requirements.

(a) In addition to GPS, the Maritime and Fixed JTR shall provide a scaleable number of channels: a minimum of 4 (threshold), with a growth capability to 10 (objective).

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(b) The JTR shall be capable of operating in sea state 5 and surviving sea state 8 on all classes of ships (threshold). JTR shall be capable of operating at sea states above 5 with minimal degraded performance (objective).

(c) The JTR will be standard 19" wide rack mountable (threshold).

(d) The Maritime and Fixed station configuration of JTR shall provide the capability for radios to be operated, controlled, and monitored from remote locations (thresholds).

(e) The JTR shall be compatible with commercial, ground mobile, and shipboard power distributed systems (threshold).

(f) The JTR will draw no more power (threshold) and draw at least 75% less power (objective) than the radios it replaces.

(g) The JTR weight shall not exceed a two person lift (threshold).

(h) The JTR shall have a minimum of 10 presets per channel (threshold) and a minimum of 20 presets per channel (objective).

(i) The JTR shall provide a standard interface with legacy shipboard and fixed station communication systems (threshold).

(j) The Maritime/Fixed Station JTR shall provide the capability to choose from among at least 12 waveforms without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms. (threshold).

(2) Security Performance Parameters. No change.

(3) Networking Performance Parameters. No change.

b. Logistics and Readiness. No change.

c. Other Systems Characteristics (Supplemental).

(1) The JTR shall be capable of being operated in low light shipboard conditions (threshold).



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(2) Temperature constraints will conform with best commercial practices (threshold).

5. Program Support. No change.

a. Maintenance Planning. No change.

b. Support Equipment (Supplemental). JTR shall utilize the Consolidated Automated Support System (CASS).

c. Human Systems Integration. All final manpower, personnel, and training (MPT) requirements will be documented in Service training plans.

d. Computer Resources. No change.

e. Other Logistics Considerations (Supplemental). No change.

f. Command, Control, Communications, Computers, and Intelligence. No change.

g. Transportation and Basing (supplemental). The JTR will be permanently installed on surface ships, submarines, and aircraft, and will be deployed worldwide as an integral component of the respective communications suite. The JTR will also be permanently installed at a variety of communications facilities ashore. The JTR will not be routinely de-installed from one platform/facility for reinstallation at another location. Actual JTR locations and delivery will be in accordance with the priorities established by major command requirements and missions.

h. Standardization, Interoperability, and Commonality. No change.

i. Geospatial Information and Services (GI&S) No change.

j. Environmental Support. No change.

6. Force Structure (Supplemental). TBD

7. Schedule Considerations. No change.

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**ANNEX C**

**GROUND FORCES DOMAIN**

1. General Description of Operational Capability. No change.

a. Overall Mission Area (Supplemental). The JTR will operate in the ground mobile environment and will provide users with access to the Joint networks. JTR ground forces family will accommodate handheld, dismounted warfighter and vehicular applications.

b. System Proposed (Supplemental). The ground force family of JTRs will provide transportable and scaleable, position location, and networking capabilities.

c. Operational Concept (Supplemental). The ground force family of JTRs will provide surface-to-surface and surface-to-air communications during operations of air and ground maneuver forces. Personnel will use this system for command and control (C2) networks, engagement operations, close air support, and position location reporting. JTRs will operate in all weather and climate conditions, on a 24-hour basis.

d. Support Concept. No change.

e. Mission Needs Statement (MNS) Summary. No change.

2. Threat. No change.

a. Threat to be Countered. No change.

b. Projected Threat Environment. No change.

c. System Threat Assessment Report (STAR). No change.

3. Shortcomings of Existing Systems. No change.

4. Capabilities Required (Supplemental). All ground forces requirements for JTR, listed below, shall be based on validated rules for Operational Facilities (OPFACs) and validated Information Exchange Requirements (IERS), between OPFACs contained in the US Army Training and Doctrine Command (TRADOC) Command, Control, Communications, and Computers Requirements Definition Program (C4RDP), or Joint equivalent.

a. System Performance (Supplemental).

(1) General Performance Requirements:

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(a) The Ground Force domain encompasses three operational configurations: Handheld, Dismounted Warfighter and Vehicular (threshold). Unless specifically stated otherwise, the following requirements refer to the three versions.

(b) The vehicular and dismounted warfighter configurations of the JTR shall provide the capability for radios to be operated and controlled from remote locations up to 2km away (threshold) and 4km (objective).

(c) A JTR shall operate at full performance levels and not degrade mission effectiveness of host systems/platforms engaged in their operational environments, including movement and weapons firing (threshold) (KPP).

(d) The JTR shall survive High Altitude Electromagnetic Pulse (HEMP) to the degree specified in MIL-STD-2169B but not be required to work through the event (threshold). Recycling of power to restore operation is acceptable.

(e) The JTR shall survive chemical, and biological attacks as well as decontamination procedures using existing solvents (threshold).

(f) The JTR shall provide a display of current own position location information at each radio (threshold).

(g) The JTR system shall provide operator selectable display modes that express its position in either the GPS latitude-longitude or the Military Grid Reference System (MGRS), that includes a 3-character grid zone, a 2-character 100km square, and an 8-digit (threshold) to 10-digit (objective) map coordinate.

(h) The JTR shall be operable and maintainable in temperatures from -40°C to +55°C (threshold).

(i) The JTRs shall provide the means to physically interconnect to selected external legacy radios to access the JTR network (threshold).

(j) The ground forces JTR shall provide the capability to choose from among at least 6 waveforms in the Handheld, and at least 10 waveforms in the Dismounted Warfighter and Vehicular configurations without loading additional software from an external source, and replace waveforms over-the-air or using a bulk storage device containing up to 30 waveforms. (threshold).

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(2) Security Performance Parameters. No change.

(3) Networking Performance Parameters. No change.

b. Logistics and Readiness (Supplemental). The JTR shall be transportable worldwide (air, rail, sea, and air droppable) (threshold).

c. Other System Characteristics (Supplemental).

(1) Physical Integration into User Platforms: Integration of JTR radios and ancillaries (e.g., installation kits power amplifiers, and antennae) into user platforms shall be accomplished with minimal demands for platform modifications.

(a) The vehicular JTR shall be smaller than the radio and ancillary equipment that it replaces (threshold) and be 75% smaller (objective) than the radio and ancillary equipment that it replaces.

(b) The handheld JTR, including the ancillary equipment, shall be no larger than the size of comparable existing handheld land mobile radios (threshold) and be capable of being integrated into Land Warrior electronic component housing (objective).

(c) The dismounted warfighter JTR, including the ancillary equipment, shall not exceed 400 cubic inches (threshold) or 200 cubic inches (objective).

(d) The vehicular JTR shall weigh less than the radio and ancillary equipment that it replaces (threshold) and weigh 75% less (objective) than the radios and ancillary equipment that it replaces.

(e) The handheld JTR, including battery and antenna, shall be no more than 3 pounds (threshold) and one pound (objective).

(f) The dismounted warfighter JTR, including ancillary equipment, shall not exceed 13 pounds (threshold) and 6 pounds (objective).

(2) Power requirements:

(a) JTRs shall draw no more primary power than the radios and ancillary equipment replaced (threshold) and draw at least 75% less power than the radios and ancillary equipment replaced (objective).

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(b) The JTR shall be capable of being operated with primary power derived from batteries and DC power systems (threshold) and from new power systems(objective).

(3) Channel requirements:

(a) In addition to GPS, the vehicular JTR shall provide up to five (threshold) and eight channels (objective).

(b) In addition to GPS, the dismounted warfighter JTR shall provide two channels (threshold) and up to four channels(objective).

(c) In addition to GPS, the handheld JTR shall provide one channel (threshold) and two channels (objective).

(4) Each JTR shall provide access to auxiliary data and voice/video/data access on each channel (threshold).

(5) Personnel Health and Safety. The JTR radios shall:

(a) Provide for safe, efficient and effective operation and maintenance by normal and typically trained personnel while wearing any combination of night vision devices, MOPP IV gear, and cold weather protective gear (threshold).

(b) Adhere to the guidance of applicable Military Standards intended to preclude or minimize exposure to health hazards and threats to soldier survivability (threshold).

5. Program Support.

a. Maintenance Planning. No change.

b. Support Equipment. No change.

c. Human Systems Integration. No change.

d. Computer Resources. No change.

e. Other Logistics Considerations. No change.

f. Command, Control, Communications, Computers, and Intelligence. No change.

g. Transportation and Basing. No change.

h. Standardization, Interoperability, and Commonality. No change.

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- i. Geospatial Information and Services (GI&S). No change.
  - j. Environmental Support. No change.
6. Force Structure. TBD
7. Schedule Considerations. No change.

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**ANNEX D**

**JTR CRYPTOGRAPHIC SYSTEMS REQUIREMENTS**

In conjunction with waveforms for JTR domain family members in Paragraph 7, Tables 1 through 3, the JTR will operate with or interface with the following cryptographic systems:

Wideband Voice

KY-68 Compatible  
STE Compatible  
KY-57/58 Compatible

Narrowband Voice

TACTERM, MINTERM, AIRTERM Compatible (ANDVT Family)  
STU-III Family

Low Speed Digital Data (<T1)

KG-84A/C (KIV-7HS), KG-94A (KIV-19) Compatible  
STE and KY-57/58 Compatible  
TACTERM, MINTERM, AIRTERM Compatible (ANDVT Family)  
KY-68 Compatible  
KGR-96 Compatible  
KG-87 Compatible

Medium Speed Digital Data

KG-175 TACLANE for ATM

Unique Systems

KG-40A Compatible (TADIL A, LINK-11)  
KGV-8, and KGV-11 Families (Netted TDMA Crypto)  
KGV-10  
PPS-SM/SAASM GPS  
SINCGARS Family  
DES

Present Cryptography

CTIC  
INDICTOR

New Cryptography

BATON  
CRAYON

Common Fill Devices

CI-13	KOK-22
CYZ-10	KYK-13
KOI-18	KYX-15
KOK-13	KOK-22

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Annex E

Joint Tactical Radio (JTR) GLOSSARY

**Authentication** - A security measure designed to establish the validity of a transmission, message, or originator, or a means of verifying an individual(s) authorization to receive specific categories of information.

**Channel** - The virtual path(s) that support(s) the capabilities (waveforms or functions) being performed by the JTR radio.

**Communications Security (COMSEC)** - Measures taken to provide security to telecommunications by converting information to a form unintelligible to an unauthorized interceptor and, subsequently, by reconverting such information to its original form for authorized recipients.

**Compliance** - The JTR meeting or implementing an approved plan to meet all applicable Joint Technical Architecture (JTA) mandates.

**Domain** - A distinct functional area that can be supported by a family or systems within similar requirements and capabilities. An area of common operational and functional requirements.

**Embedded Training** - Training that is provided by capabilities designed to be built into or added onto operational systems to enhance and maintain the skill or proficiency necessary to operate and maintain that equipment end item.

**Hybrid Network** - A network that is composed of components from more than one user JTR interface.

**Installation Kit** - The components provided to minimize domain specific platform integration impact. The kit supports the JTR's physical installation, includes ancillary equipment and operational interconnection/interfaces, e.g., rack adapters, cables/cable harness, power amplifiers, power supplies, antenna couplers, antennas, etc.

**Integrity** - The property that data, systems, services, and other controlled resources have not been altered or destroyed in an unauthorized manner. It is the quality of an information system (IS) that reflects the logical correctness and reliability of the operating systems and the logical completeness of the hardware and software that implement the protection mechanisms.



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**JTR Network** - The actual network architecture/structure that a JTR will interconnect.

**JTR System** - Refers to the JTR and the host(s) that the JTR will connect to: domain name server, router, and network/frequency management system as applicable.

**Multi-band** - The JTR capability to operate in the frequency spectrum between several defined limits.

**Multimode** - The JTR ability to support, operate and exchange voice, video, and data between terminals using several different transmission channels (frequencies) and waveforms.

**Multiple Communications** - The JTR ability to transfer information, among several users or processes, according to agreed conventions.

**Networked JTR** - The JTR that will be fielded in FY02 with networking capability.

**Transmission Security (TRANSEC)** - The protection of the communications paths against attack. Defensive measures include anti-jam, low probability of detection, low probability of intercept, spread spectrum techniques such as frequency hopping and direct sequence spreading, and protected distribution.

**Waveform** - The representation of a signal as a plot of amplitude versus time.